HALISSON YOSHINARI FERREIRA DA CRUZ

AVALIAÇÃO DO *SLICS* NO TRATAMENTO DAS LESÕES DA COLUNA CERVICAL SUBAXIAL

"EVALUATION OF THE SLICS USE IN THE TREATMENT OF SUBAXIAL CERVICAL SPINE INJURIES"

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Faculdade de Ciências Médicas

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Dissertação de Mestrado apresentada à Faculdade de Ciências Médicas da Universidade Estadual de Campinas como parte dos requisitos exigidos para obtenção do título de Mestre em Ciências Médicas, área de concentração em Neurologia

"Thesis submitted to the Medical Sciences Faculty of the State University of Campinas as part of the requirements for obtaining a Master's Degree in Medical Sciences, Concentration area in Neurology"

Orientador: Prof Dr Helder Tedeschi

Co-orientação Prof Dr Andrei Fernandes Joaquim

Este exemplar corresponde à versão final da dissertação defendida pelo aluno **HALISSON YOSHINARI FERREIRA DA CRUZ** e orientado pelo **PROF. DR. HELDER TEDESCHI**

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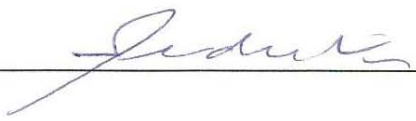
1. **PROF(A). DR(A). HELDER TEDESCHI** 
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Introdução: O SLICS (*Subaxial Cervical Spine Injury Classification System*) foi proposto para auxílio na tomada de decisão do traumatismo da coluna cervical sub-axial, contudo poucos trabalhos avaliaram sua segurança e eficácia. **Método:** comparar coorte histórica de pacientes tratados com base na preferência do cirurgião com pacientes tratados baseando-se no escore obtido com a aplicação do sistema. Foram incluidos pacientes com lesão traumática aguda de C3-7 com exames radiológicos e dados clínicos completos. O status neurológico foi avaliado através do *ASIA Impairment Scale (AIS).*

Resultados: entre 2009-10, 12 pacientes foram incluídos (seguimento médio de 24,5 meses). Na admissão hospitalar 5 pacientes (41,6%) apresentavam AIS E, 1 (8,3%) AIS D, 1 (8,3%) AIS C, 1 (8,3%) AIS B e 4 (33.3%) AIS A. Dois de sete pacientes com déficit incompleto melhoraram durante o seguimento clínico. O SLICS escore variou de 2 a 9 pontos (média de 5.5 e mediana de 5.75), onde dois pacientes tinham escore menor do que 4. Entre 2011-13, 28 pacientes foram incluídos (média de 6,1 meses), com média de idade de 41,5 anos. Na admissão hospitalar 12 pacientes (42,9%) apresentavam AIS E, 4 (14,3%) AIS D, 5 (17,9%) AIS C, 2 (7,15%) AIS B e 5 (17,9%) AIS A. Seis pacientes entre os 11 com déficit incompleto apresentaram melhora. O escore de SLICS variou de 4 a 9 pontos, com média e mediana de 6.

Conclusões: observamos que após a aplicação do sistema, houve uma diminuição de indicação cirúrgica nos pacientes com lesões mais estáveis ou menos graves, sem que se detectasse piora neurológica em ambos os grupos. Isso sugere que o SLICS pode ser útil para auxiliar a diferenciação das lesões mais instáveis que acometem a coluna cervical sub-axial que requeiram tratamento cirúrgico.

ABSTRACT

Introduction: The SLICS (Subaxial Cervical Spine Injury Classification System) was proposed to help in the decision-making process of surgical treatment of sub-axial cervical spine trauma, eventhough the literature assessing its safety and efficacy is scarce.

Methods: we compared a cohort series of patients treated based on surgeon's preference with patients treated based on the SLICS. We have only included patients with acute spinal trauma from C3-7 that had complete clinical and radiological data. **Results:** between 2009-10, 12 patients were included (mean 24.5 months of follow-up). The preoperative AIS was: 5 patients (41.6%) were AIS E, 1 (8.3%) AIS D, 1 (8.3%) AIS C, 1 (8.3%) AIS B and 4 (33.3%) AIS A. Two out of seven patients had neurological improvement during follow-up. The SLICS score ranged from 2 to 9 points (mean of 5.5 and median of 5.75 points) with two patients with less than 4 points. From 2011-13, 28 patients were included with a SLICS (mean of 6.1 months of follow-up). The preoperative AIS was: 12 patients (42.9%) with AIS E, 4 (14.3%) AIS D, 5 (17.9%) AIS C, 2 (7.15%) AIS B and 5 (17.9%) AIS A. Six patients out of 11 had some neurological improvement. The SLICS score ranged from 4 to 9 points (mean and median of 6). There was no neurological deterioration in any group.

Conclusions: after using the SLICS there was a decrease in the number of patients with less severe injuries that were treated surgically, with no reflection on neurological outcome. This suggests that the SLICS can be helpful in differentiating mild from severe injuries, potentially improving the results of treatment.

SUMÁRIO

Dedico

Ao meu pai,
José Ferreira da Cruz,
que apesar de não estar mais presente,
foi o meu alicerce e responsável por
todas minhas conquistas.

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LISTA DE TABELAS

SLICS Subaxial Cervical Spine Injury Classification System

ASIA American Spine Injury Classification

AIS American Impariment Scale

C3 Terceira Vértebra cervica

C7 Sétima vértebra cervical

TCCS Trauma da Coluna Cervical Subaxial

CDL Complexo Disco-ligamentar

SCST Subaxial Cervical Spine Trauma

O trauma raquimedular é uma patologia muito comum, que acomete principalmente homens jovens no auge de sua capacidade produtiva, muitas vezes resultando em lesão neurológica grave e incapacidade permanente. A região cervical é um dos locais da coluna vertebral mais suscetíveis ao trauma raquimedular devido sua grande mobilidade e sua proximidade com a coluna torácica mais rígida[1].

O trauma da coluna cervical subaxial (TCCS), que englobam os níveis de C3 a C7, é responsável pela maioria dos traumas da coluna cervical, correspondendo a aproximadamente 65% das fraturas e 75% das luxações que acometem toda a coluna vertebral[1].

Na tentativa de melhorar os resultados clínicos e comparar as modalidades de tratamentos, inúmeros sistemas de classificações que descrevem essas lesões tem sido propostos, os quais tentam predizer a estabilidade e ajudar na escolha do tratamento a ser realizado[2,3,4]. No entanto, até o momento nenhuma classificação é universalmente aceita. Dentre as razões para a falta de uma classificação universal é que o tratamento do TCCS baseia-se em muitas variáveis, que incluem o padrão da fratura, mecanismo de lesão suspeito, alinhamento da coluna vertebral, déficit neurológico, estabilidade esperada a longa prazo, dificultando a reprodutibilidade e a confiabilidade das classificações.

Considerando isso, o *Spine Trauma Study Group*, formado por especialistas no tratamento da coluna vertebral mundialmente conhecidos, propuseram o "*Sub-axial Cervical Spine Injury Classification System (SLICS)*". Esse sistema é baseado na avaliação de três características principais da lesão:

(1) Morfologia da Lesão, determinada pelo padrão de ruptura da coluna vertebral nos exames de imagem;

(2) Integridade do complexo discoligamentar (CDL) representado pelas estruturas ligamentares anteriores e posteriores, bem como o disco intervertebral, e

(3) Status Neurológico do paciente.

O sistema propõe uma graduação do escore de Gravidade, do menor até o mais severo padrão de gravidade. A pontuação final pontuação pode ajudar na escolha do tratamento conservador ou cirúrgico.

A presença de anormalidades morfológicas é graduada como: **1-** compressão, **2-** fraturas em explosão, **3-** distração, e **4-** translação ou rotação.

Os componentes do CDL incluem o disco intervertebral, ligamento longitudinal anterior e posterior, ligamentos interespinhosos, cápsulas facetárias e ligamento amarelo. A integridade destes tecidos moles de constrição é diretamente proporcional a estabilidade da coluna vertebral e é graduado como: **0-** intacto, **1-** indeterminado e **2-** roto.

O status neurológico é o terceiro componente do SLICS e é inerentemente um importante indicador de gravidade do trauma raquimedular, e pode ser o fator isolado mais influente em predizer o tratamento. Pacientes neurologicamente intactos recebem 0 pontos, 1 ponto os com lesão radicular, 2 os com lesão neurológica completa, e a presença de déficit neulológico incompleto recebe a pontuação mais alta de 3 pontos. Na presença de compressão radicular ou medular persistente em vigência de déficit neurológico, os autores propuseram um ponto adicional. Além disso, fatores de confusão podem influenciar na decisão do tratamento incluindo: comorbidades médicas, presença de espondilite anquilosante, hiperostose idiopática difusa, osteoporose, cirurgias prévias, e doença degenerativa. O SLICS score é apresentado na Tabela 1.

O tratamento cirúrgico versus conservador é sugerido através de um limite do valor da pontuação do SLICS. Se o score for <4 (1 a 3 pontos), o tratamento conservador é recomendado. Se o score for ≥5, o tratamento

cirúrgico é recomendado. Este tratamento pode consistir de realinhamento, descompressão neurológica (quando indicada), e estabilização. Caso o score totalize 4 pontos, pode ser indicado o tratamento cirúrgico ou conservador, baseado na preferência do cirurgião e do paciente, bem como considerando outros fatores, como comorbidades, status clínico do paciente, condições do serviço, entre outras.

OBJETIVO

Baseado nos promissores benefícios dessa classificação, o objetivo desse estudo é avaliar o impacto da aplicação do *SLICS* no tratamento dos pacientes com trauma da coluna cervical subaxial tratados cirurgicamente.

EVALUATION OF THE SLICS USE IN THE TREATMENT OF SUBAXIAL CERVICAL SPINE INJURIES

AVALIAÇÃO DO *SLICS* NO TRATAMENTO DAS LESÕES DA COLUNA CERVICAL SUB-AXIAL

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EVALUATION OF THE SLICS USE IN THE TREATMENT OF SUBAXIAL CERVICAL SPINE INJURIES

ABSTRACT

Introduction: The SLICS (Sub-axial Cervical Spine Injury Classification System) was proposed to help in the decision-making of sub-axial cervical spine trauma (SCST), eventhough the literature assessing its safety and efficacy is scarce.

Methods: We compared a cohort series of patients surgically treated based on surgeon's preference with patients treated based on the SLICS.

Results: from 2009-10, 12 patients were included. The SLICS score ranged from 2 to 9 points (mean of 5.5). Two patients had the SLICS < 4 points. From 2011-13, 28 patients were included. The SLICS score ranged from 4 to 9 points (mean of 6). There was no neurological deterioration in any group.

Conclusions: after using the SLICS there was a decrease in the number of patients with less severe injuries that were treated surgically. This suggests that the SLICS can be helpful in differentiating mild from severe injuries, potentially improving the results of treatment.

Key Words: sub-axial cervical spine, SLICS, spinal cord injury, spine trauma, classification, treatment.

AVALIAÇÃO DO *SLICS* NO TRATAMENTO DAS LESÕES DA COLUNA CERVICAL SUBAXIAL

RESUMO

Introdução: O *SLICS (Subaxial Cervical Spine Injury Classification System)* foi proposto para auxílio na tomada de decisão no tratamento do traumatismo da coluna cervical sub-axial, embora haja poucos trabalhos que avaliem sua segurança e eficácia.

Método: Realizamos estudo comparativo de série histórica de pacientes operados baseados na indicação pessoal do cirurgião com pacientes tratados após aplicação do SLICS.

Resultados: entre 2009-10, 12 pacientes foram incluídos. O SLICS escore variou de 2 a 9 pontos (média de 5.5) com dois pacientes com escore menor que 4. Entre 2011-13, 28 pacientes foram incluídos. O escore de SLICS variou de 4 a 9 pontos, com média de 6.

Conclusões: observamos que após o uso do SLICS houve uma diminuição do número de pacientes operados com lesões mais estáveis. Isso sugere que o SLICS pode ser útil para auxiliar a diferenciação de lesões leves das graves, potencialmente melhorando os resultados do tratamento.

Descritores: traumatismo da coluna vertebral, SLICS, lesão medular, trauma de coluna, classificação, tratamento.

INTRODUCTION

Cervical spine trauma can potentially result in serious neurological injury such as tetraplegia or severe disability. Sub-axial cervical spine trauma (SCST), involving the spine levels of C3 to C7, accounts for the majority of cervical spine injuries, comprising about 65% of fractures and 75% of all dislocations that affects the spine[1].

In an attempt to improve clinical results and compare treatment modalities, numerous classification systems that describe these injuries, try to predict stability, and also help with the choice of the treatment to be performed, have been proposed[2,3,4]. However, no one of them is universally accepted. One potential reason for the lack of a universal classification is that the treatment of SCST is based on a number of variables that include fracture patterns, suspected mechanism of injury, spinal alignment, neurologic injury, and expected long-term stability, which difficults reliability and reproducibility.

Considering this, the Spine Trauma Study group proposed the Sub-axial Cervical Spine Injury Classification System (SLICS). This system is based on the evaluation of three major injury characteristics as follows: **(1)** injury morphology, determined by the pattern of spinal column disruption on available imaging studies, **(2)** integrity of the discoligamentous soft tissue complex (DLC) represented by both anterior and posterior ligamentous structures as well as the intervertebral disc, and **(3)** patient's neurologic status. The system proposes a severity score grading, from the least to the most severe injury pattern[1]. The final score can help in the choice of conservative versus surgical treatment. The presence of morphological abnormalities is scored as: **0-** no abnormality, **1-** compression, **2-** burst fractures, **3-** distraction, and **4-** translation or rotation. The components of the DLC include the intervertebral disc, anterior and posterior longitudinal ligaments, interspinous ligaments, facet capsules, and ligamentum flavum. The integrity of these soft tissue constraints is directly proportional to spinal stability and is scored as **0-** for intact, **1-** for indeterminate and **2-** with disruption. Neurologic injury is the third component of the SLIC system and is inherently an important indicator of the severity of spinal

column injury and may be the single most influential predictor of treatment. Patients neurologically intact receive **0-** point, **1-** for cervical root injury, **2-** for complete neurological deficit, and the presence of an incomplete neurologic injury receives the highest point score of 3. In the presence of ongoing root or cord compression the authors proposed an additional 1 point. Additionally, confounding factors can influence the treatment decision including medical comorbidities, presence of ankylosing spondylitis, diffuse idiopathic hyperostosis, osteoporosis, previous surgery, and degenerative disease[1]. The SLICS score is presented in Table 1.

Surgical versus non-surgical treatment is suggested by a threshold value of the SLICS score. If the total score is <4 (1 to 3), non-operative treatment is recommended. If the total is ≥ 5, operative treatment is recommended. This treatment may consist of realignment, neurological decompression (when indicated), and stabilization. Cases with a total score of 4 may be treated either operatively or non-operatively based upon surgeon and patient preferences. Table 1 exemplify the SLICS graduation score.

Based on the potential benefits of the score, the purpose of this study is to evaluate the impact of SLICS in patients treated surgically for SCST.

MATERIAL AND METHODS

The spine trauma database at the University of Campinas, Campinas-SP, Brazil was used. The institution is a tertiary trauma center. There were two group of patients:

Group 1- from 2009 to 10, these patients were treated according to the treating surgeon's preference, based on personal decisions for conservative versus surgical treatment but not guided by the SLICS score. The SLICS was applied retrospectively on this group.

Group 2- from 2011-13, the SLICS was used to guide the treatment (patients with four or more points were referred to surgery).

Inclusion criteria: patient's age (>17), presence of sub-axial cervical injury treated surgically (main level of trauma from C3 to C7), and complete radiological and clinical data for retrospective application of the SLICS. The medical records and radiological data were considered adequate for retrospective application of the SLIC when the three injury characteristics of the SLIC could be scored properly, with a CT scan or a CT and MRI.

Exclusion criteria: incomplete radiographic or clinical data, pathological fractures (infection, cancer), isolated upper cervical trauma (occiput to C2), isolated transverse process or spinous process fractures, chronic or age determinate fractures, isolate MRI findings, and severe systemic trauma with death prior to surgical treatment.

Demographic data included: age, gender, injury characteristics and treatment details were recorded, including trauma ethiology, fracture level (in segmental trauma we considered the upper vertebra as the level of injury), neurological status, surgical approach and complications. Follow-up included clinical assessment of the neurological status, at least one post-operatory CT scan with reconstruction to check instrumentation and serial plain radiographs at 1, 3, 6 months and them anually.

The SLICS from 2009 to 10 was scored retrospectively based on clinical and radiological data reviewed by two authors (HYFC and AFJ) both board-certified neurosurgeons. From 2011-13, the SLICS was applied by AFJ, the main surgeon.

Neurological status was scored according to the American Spinal Injury Association (ASIA) Impairment Scale (AIS) in complete (AIS A), incomplete (AIS B, C or D), or intact (AIS E)[5].

Confounding factors (e.g., ankylosing spondylitis, diffuse idiopathic hyperostosis, osteoporosis, previous surgery, and degenerative disease) were noted if present.

Outcomes of treatment during follow-up, the approach used, as well as, complications directed related to the surgical procedure (neurological deficit and surgical complications) were recorded. Institutional ethical committee approval was obtained prior to initiation of the study (129/2011). There was no external funding source for this study.

RESULTS

A total of 12 patients were surgically treated and had total radiological and clinical data for inclusion on this study from 2009-10. From 2011-13, twenty eight patients were treated surgically based on the SLIC score and were included.

Surgical Group 2009-2010 - (12 Patients)

From a total of 21 were operated from 2009-10, but just 12 cases surgically treated were included because considering our inclusion criteria. Nine (75%) were male and 3 (25%) were female. Table 2 summarizes the results of this group.

The follow up ranged from 1.8 to 65.5 months (mean of 24.5). Patient's age ranged from 17 to 60 years (mean 29.5).

Regarding the level of injury, one patient (8.3%) had injury at C4, 4 (33.3%) at C5, 5 (41.6%) at C6, 2 (16.6%) at C7 and no one at C3. In two patients the trauma was caused by motor vehicle rollover and in one case by a motorcycle accident. Another two patients had falls from heights, four patients were hit by cars and three had dived into shallow water.

Preoperatively, 5 patients (41.6%) were AIS E, 1 (8.3%) AIS D, 1 (8.3%) AIS C, 1 (8.3%) AIS B and 4 (33.3%) AIS A. No patients had neurological worsening. At the final follow up, two patients (28.5% of the patients with neurological deficits) improved the AIS status (AIS B to C and B to D).

The SLICS score in this group ranged from 2 to 9 points (mean of 5.5, median of 5.75 and SD ± 2.05). Two patients (16.6%) with a SLICS of less than 4 points were operated, one with SLICS of 2 points (2 burst + 0 for DLC + 0 for neurological status) and other with a SLICS of 3 points (0 for morphology + 0 for DLC + 3 for incomplete neurologic injury - AIS D). Four patients (33.3%) had 5 points, two (16.6%) 6 points, one (8.3%) 7 points, two (16.6%) 8 points, and one (8,3%) had 9 points.

Six patients (50%) underwent an anterior approach and the other six (50%) underwent a posterior approach, with the objective of spinal realignment, stabilization and decompression. Combined approaches (anterior and posterior) were not used from 2009-10.

Complications included postoperative wound infection after instrumented posterior cervical fusion in 1 patient (neurologically intact) and one tracheoesophageal fistula requiring direct surgical repair of the esophagus. There were no deaths.

Surgical Group 2011-2013 - (28 Patients)

Data from the 28 cases of cervical spine trauma treated surgically based on the SLICS score from 2011-2013 is presented in Table 3. Follow-up was obtained in all 28 patients, ranging from 0.1 to 24 months (mean of 6.1).

Patients' age ranged from 20 to 82 years (mean 41.5). Twenty-five (89.3%) were male and 3 (10.7%) were female.

Regarding the level of injury, 8 patients (28.6%) had the trauma at C3, 5 (17.9%) at C4, 7 (25%) at C5, 8 (28.6%) at C6 and no one at C7. The main cause of trauma was car accidents in twelve patients (42.9%), nine patients (32.1%) fell from heights, in three cases (10.7%) the cause was motorcycle accidents, two (7.15%) dove into shallow water and two (7.15%) had direct traumas.

Preoperatively, 12 patients (42.9%) were AIS E, 4 (14.3%) AIS D, 5 (17.9%) AIS C, 2 (7.15%) AIS B and 5 (17.9%) AIS A. No patients had neurological worsening.

At the final follow up, the AIS score was: 13 (46.64%) AIS E, 6 (21.4%) AIS D, 4 (14.3%) AIS C, and 5 (17.9%) AIS A.

A total of six out of eleven (54.5%) patients with incomplete neurological deficit (AIS B-C-D) improved their ASIA status during the follow-up (Table 3).

The SLICS score in this group ranged from 4 to 9 points (mean of 6, median of 6 and SD ± 1.4). The two patients with a SLICS of 4 points had a central cord syndrome without fractures or dislocations.

Twelve patients (42.9%) underwent an anterior approach, thirteen (46.4%) a posterior approach and three (10.7%) a combined approach. No preoperative traction was used in any case of this series.

Complications directed related with surgery in this group included one wound infection (posterior approach) requiring surgical debridement. One patient had a deep venous thrombosis prior to surgery and received an inferior vena cava filter and another patient the diagnosis of an intraoperative dural tear treated with fibrin glue and muscle graft.

DISCUSSION

Despite the technological advances in surgical techniques for spinal instrumentation, classification of SCST remains largely descriptive, lacking standardization and usually correlates poorly with clinical outcomes[1].

Historically, one of the first comprehensive classification systems for spinal injuries was credited to Holdsworth[2]. His system was important once it was the first to emphasize the importance of the posterior ligamentous complex (PLC) in long term stability (noteworthy, the evaluation of the ligamentous complex is one of the three main categories evaluated by the SLICS).

In 1982, Allen et al.[3] subsequently proposed their mechanistic classification scheme for subaxial injuries, which was also based upon the findings of plain radiographs. A total of six main categories were defined by Allen: compressive flexion, vertical compression, distractive flexion, compressive extension, distractive extension, and lateral flexion. A potential and important limitation of the Allen's classification is considering only plain radiographs to interpret the mechanism of injuries, which can result in low reliability and poor clinical outcome relationship[6].

The AO Spine group also extrapolated their thoracolumbar system for cervical injuries, classifying them into three main groups: group A, with compression and burst fractures, group B with distractive injuries and group C, with rotational injuries. This system is widely adopted and can help surgeons in describing injuries, although it is criticized by not considering the role of the neurological status in the decision-making process[7].

The sub-axial injury classification system (SLICS) was developed by Vaccaro et al. to define a classification system for SCST that conveys information about injury patterns and severity as well as treatment considerations and prognosis, such as neurological status and the role of the ligamentous complex in long-term stability[1,8,9].

The SLICS had already demonstrated validity in previous studies: in a retrospective clinical study of patients with SCST treated, 14 patients were treated non-surgically (C), whereas 24 were treated surgically (S). In the C group, the SLIC score ranged from 0 to 5 points (mean 1.07; median 1). Just 1 patient had an SLIC score greater than 2 (7.1% of the patients). In the S group, the SLIC score ranged from 1 to 10 points (mean 5.6; median 6). Just 2 patients had an SLICS score smaller than 4 (both with 1 point each, 8.3% of the total group). All the other 22 (accounting for 91.6%) patients had an SLICS of 4 or more points. The SLIC score matched the treatment chosen (non surgical or surgical) with more than 90% of agreement between them[10].

A prospective application of the SLICS in a consecutive series of 37 patients with SCST to define injuries and guide surgical decision is also reported. Patients with four or more points were surgically treated, whereas patients with less than 4 points were conservatively managed. Twenty-three patients were included in the non-surgical group: 14 (61%) of them with some follow-up at the original institution. Follow-up ranged from three to five months (mean of 4.42; median 4). The SLICS score ranged from 0 to 6 points (mean and median of 1). One patient with a SLICS of 6 points refused surgery[11].

In the surgical group: twenty-five patients were operated, follow-up after hospital discharge was obtained in 23 (92%) patients (range from one to 24 months, mean of 5.82 months). The SLICS score in the surgical group ranged from 4 to 9 points (mean and median of 7). No patients had neurological worsening. Eight out of 13 patients with incomplete deficits had some improvement in the ASIA score. In this study the SLICS system was identified as being safe and effective at preventing neurological deterioration and, in most patients, led to clinically relevant improvements in neurological function[11].

Although our study has some limitations, such as relative small sample and single center involved, we could observe a trend that after the use of the SLICS to guide treatment of SCST, there were no patients operated with low injury score (group 2011-2013) compared with 2 of 12 patients (16.67%) treated with mild

injuries (group 2009-10). This can suggest that SLICS may helps surgeons with the standardization of care as well as with the choice of more unstable patterns for surgical treatment.

The SLICS is a comprehensive and useful tool to guide SCST treatment by spine surgeons. Larger prospective multicentre studies including conservative and surgically treated patients are necessary to access benefits in patient's outcome with its use.

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Table 1- The Subaxial Cervical Spine Injury Classification System

Morphology	Points
No abnormality	0
Compression	1
Burst	2
Distraction (eg, facet perch, hyperextension)	3
Rotation/traslation (eg, facet dislocation, unstable teardrop or advanced staged flexion compression injury)	4
Discoligamentous complex (DLC)	
Intact	0
Indeterminate (eg, isolated interspinous widening, MRI signal change only)	1
Disrupted (eg, widening of the disc space, facet perch, or dislocation)	2
Neurological status	
Intact	0
Root injury	1
Complete cord injury	2
Incomplete cord injury	3
Continuous cord compression in setting of neuro deficit (“neuromodifier”)	+1

MRI- magnetic resonance imaging

Table 2- Summary of the 12 patients surgically treated from 2009-2010

N	SEX	AGE	LEVEL	AIS	SLICS	COMPLICATIONS
1	M	31	C6	A	7	Infection
2	M	38	C5	E	5	No
3	M	53	C4	E	5	No
4	F	28	C6	E	5	No
5	M	20	C5	B to C	8	No
6	M	17	C5	B to D	8	Tracheoesophageal fistula
7	F	43	C5	D	3	No
8	M	23	C6	E	2	No
9	M	60	C6	C	9	No
10	M	43	C7	E	6	No
11	F	21	C7	A	5	No
12	M	22	C6	A	6	No

Table 3- Summary of the 28 patients surgically treated from 2011-2013

N	SEX	AGE	LEVEL	ASIA	SLIC	COMPLICATION
1	M	26	C3	A	7	No
2	M	22	C3	A	8	No
3	F	48	C6	E	5	No
4	M	23	C4	E	5	No
5	M	65	C6	C	8	No
6	M	40	C5	E	6	No
7	M	45	C6	E	5	No
8	F	71	C6	B to C	8	No
9	F	48	C6	E	7	Infection
12	M	65	C6	C	6	Deep venous thrombosis
13	M	46	C5	E	5	No
14	M	40	C3	A	4	No
15	M	82	C5	B to C	9	No
16	M	29	C5	D to E	5	No
17	M	28	C6	E	5	No
18	M	23	C4	A	8	Dural injury
19	M	49	C4	E	6	No
20	M	45	C4	E	7	No
21	M	20	C5	D	7	No
22	M	43	C3	C to D	4	No
23	M	56	C5	E	7	No
24	M	54	C3	C to D	6	No
25	M	32	C4	E	6	No
26	M	40	C3	D	5	No
27	M	23	C6	E	6	No
28	M	51	C3	C to D	5	No

CONCLUSÃO GERAL

Embora nosso estudo apresente algumas limitações, como a aplicação retrospectiva do escore no grupo inicial e a falta de pacientes tratados não cirurgicamente, pudemos observar que com a aplicação do sistema não houve nenhum paciente operado com lesões consideradas estáveis (SLICS menor do que 4 grupos), em comparação ao grupo histórico (2009-10) Isto sugere que o SLICS pode ajudar os cirurgiões na padronização do tratamento dos pacientes com TCCS e possivelmente identificar as lesões mais graves, ou seja aquelas com pontuação mais elevada em que é proposto o tratamento cirúrgico.

O SLICS é uma ferramenta abrangente e útil para guiar o tratamento do TCCS. Estudos multicêntricos prospectivos randomizados incluindo pacientes tratados cirurgicamente e conservadoramente são necessários para avaliar o real impacto do SLICS no tratamento do traumatismo raquimedular cervical.

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